Annual Report

1988-89

Centre for Resource Studies

Annual Report for the Period

1 May 1988 to
30 April 1989

90-02768/

Centre for Resource Studies

Origins and Objectives

The Centre for Resource Studies (CRS) is a co-operative research institute established at Queen's University in 1973. Funded by The Mining Association of Canada and the federal Department of Energy, Mines and Resources, and co-sponsored by Queen's University, its function is to improve understanding of the complex questions underlying issues of mineral resource policy (excluding oil and gas). The purposes of the Centre are accomplished through a program of research and publication, and by providing opportunities for liaison between representatives of federal and provincial governments, the industry, labour, universities and other interested groups. Research contract and grant support is provided by CRS, principally to academic researchers in Canadian universities, for research in mineral policy and mineral economics with relevance to Canadian mineral producers.

Summary of Activities 1975-89

In 1975, a multi-disciplinary research program on the national impact of mining, was launched to study the effects of the mining industry on the economy and on other aspects of Canadian society. This program was completed in 1978. Late in 1976 a second major research thrust was undertaken, with the objective of examining the mineral-related policies and programs of the federal and provincial jurisdictions in Canada. Studies arising from both programs have been published as monographs and working papers, the first appearing in 1976. As of April 1989, twenty-three monographs and forty-three working papers have been published on these and other topics. In 1981 a new series of publications entitled technical papers was introduced, and eight have been published in this series so far. In addition, twenty-nine issues of CRS Perspectives have been distributed to our mailing list which now has approximately 4,500 names.

In 1977 the Centre held the first of a series of CRS Policy Discussion Seminars. Each seminar brings together, in a constructive working environment, invited representatives with a diversity of interests to discuss a topic of current policy concern. Each gives rise to a set of proceedings which contains the text of papers presented at the seminar, as well as a digest of discussions. Nineteen seminars have been held up to April 1989.

Further details of CRS activities may be found in later sections of this report. The Executive Director and Board of Directors wish to acknowledge the contribution of CRS staff, associates, and committee members. Without their strenuous efforts and generous allocation of time, the accomplishments of the past year would not have been possible.

1988-89 Activities

The major change in CRS activities in 1988-89 was the departure of the Executive Director, David Anderson, who left CRS in May 1988 to take up his appointment as Dean of the School of Business at Queen's University in September. During his four years as Executive Director, Dr. Anderson brought new vitality and directions to the Centre's research program, through an expanded program of CRS-funded research at Canadian universities, an increase in the international focus and content of the Centre's research, and through his own research contributions, which have been both substantial and highly regarded. Dr. Anderson's CRS publications during this period include a monograph, *An Analysis of Japanese Coking Coal Procurement Policies: The Canadian and Australian Experience*, and a technical paper, *An Inter-Sectoral Study of Canada's Resource Industries*; further publications on coal are forthcoming.

Outside of CRS, Dr. Anderson published 14 papers during the 4-year period, covering such topics as resource taxation, Saskatchewan government policies, the Canadian potash industry, Japanese coking coal procurement policies, and issues related to the Canada-U.S. trade negotiations, including the potential impact of a trade agreement on the Canadian mineral industry, and the subsidy question. He also made a number of presentations to organizations and meetings on related subjects. During the negotiations for the Canada-U.S. trade agreement, Dr. Anderson served on the Special Advisory Group on International Trade (SAGIT), Minerals and Metals, established to provide background information for the Canadian negotiating team, and on two mineral-related subcommittees (coal and potash). The Centre for Resource Studies was sorry to see Dr. Anderson leave, but sent him on to his new and challenging position with warmest wishes for further successes.

In September 1988, Margot Wojciechowski was appointed Executive Director of the Centre. Mrs. Wojciechowski has been associated with the Centre since 1977, and has served as research assistant, assistant director, associate director, and acting executive director. Her responsibilities at the Centre have included editing CRS monographs and papers, organization of seminars, and editing of seminar proceedings. She has also authored CRS publications in areas including government policy and program initiatives affecting the mineral sector, land claims and native issues related to mineral development, and policies related to R&D and technological innovation. Her current research interest involves an international comparison of R&D funding trends in earth sciences and in the mineral sector.

Mrs. Wojciechowski is a member of the Canadian Institute of Mining and Metallurgy, where she has held various local and divisional offices, and the Prospectors and Developers Association of Canada. She serves on the Mineral Processing Subcommittee of the Minister's National Advisory Council to CANMET (MNACC) and the Minerals and Metals subcommittee of the SAGIT, and is on the editorial board of *Resources Policy*.

Research activities during 1988-89 continued to focus on international competitive position and on domestic mineral supply issues. Completed research projects included the economic comparison of mineral potential in northern and southern Canada by Leo Verleun and Brian Mackenzie, which concluded that more remote does not necessarily mean less economic. Carmine Nappi's study of metals demand and implications for Canadian mineral producers was completed, as was Margaret Slade's study of metal pricing, which looked at the process and effects of the transition from producer pricing systems to metal exchanges.

Externally funded projects completed included additional work by Dr. Mackenzie and his associates on locational aspects of mineral development potential in Ontario and Newfoundland. Alan and Ann Green completed a study of domestic processing of minerals in Ontario, which was part of a general review of the Ontario Mining Act. Margot Wojciechowski completed two parallel comparative studies of R&D funding trends, one in earth sciences and one in mining and processing.

Research in progress during the year emphasized international aspects of the mineral industry, looking at Canadian coal exports and competition with Australia in the Pacific Rim markets, at protectionist activities in support of U.S. mineral producers, at competition from state-owned mining industries, and at the implications of proposed tariff reduction for Canadian mineral producers. Brian Mackenzie continued work in his mineral deposits data base, updating and adding data on gold and uranium deposits, and performing related economic analyses. Taxation and R&D studies were also underway.

The CRS Policy Discussion Seminar series continued with the 19th session in November 1988, on the subject of mineral marketing policy. Proceedings of the 18th seminar were published during the year, under the title *Prospects for Minerals in the 1990s*. In addition, two monographs, one working paper and one technical paper were published during the year.

Research Completed in 1988/89

Research Funded by CRS

Evaluating the Restructuring Strategies of Canadian Mining Firms in the Recession 1977-1985
John Bradbury, McGill University

This project evaluated the restructuring and winding-down strategies of mining companies during the period from 1977-79 through to 1985-86. A mail survey of a sample of mining companies in eight different mining regions and sectors sought information on corporate strategies during this period of crisis in the industry. Data sets in Statistics Canada on overall expenditures by mining type and general data sets available at EMR in Ottawa on investments in different aspects of mining were reviewed. These two data sets were compared as well as the corporate responses across Canada in eight different regions and different mineral types.

An Assessment of the Effects of Countertrade on the Canadian Mining Industry
Andrew F. Cooper, University of Waterloo

During the 1980s there has been a marked increase in the number of countries actively promoting countertrade as a means of conducting international transactions. This project studied the impact of countertrade on the Canadian mining industry and assessed the extent of Canadian involvement in techniques which fell into this category. The researcher provided an overview of the nature and scope of countertrade in the international mining industry, then focused on the impact of global countertrade on Canadian policy and practice, and finally, assessed the involvement of Canadian mining companies (and others whose activities might have a bearing on the mining industry) in countertrade.

Economic Comparison of Mineral Supply Potential in Northern and Southern Canada
Brian Mackenzie and Leo Verleun, Centre for Resource Studies

This study compared endowment and locational characteristics of exploration and mining in the northern territories with those of the more-accessible southern provinces. The first stage of the study was completed under contract to Indian Affairs and Northern Development Canada in March 1984. A more thorough analysis was subsequently carried out in Leo Verleun's masters thesis, completed in late 1984. This work has been further extended and published as monograph number 21.

Metals Demand and the Canadian Mineral and Metal Industry: Structural Changes and Policy Implications
Carmine Nappi, University of Montreal

The objectives of this work were to examine the extent to which there are long-run structural change in the Western economies' demand for aluminum, copper, lead, nickel and zinc; to explain that change in assessing the relative importance of the income effect and the conservation-structural effect; to evaluate the implications of structural changes in metals demand on market structure, on firms' pricing and R&D; and finally to study possible effects on the formulation of a mineral policy for Canada and its provinces. This study was published as a CRS monograph.

The Impact of Alternative Pricing Systems on the Canadian Mineral Producers
Margaret Slade, University of British Columbia

There are a multitude of unresolved issues concerning the mechanisms of commodity exchanges and producer pricing. This study is a first step in the determination of whether commodity exchanges fairly determine the price of metals and should therefore be supported. Through interviews and library research the researcher focused on the way a particular commodity is sold and the specific institutional arrangements which distinguish this market from others. A statistical analysis of pricing and production trends examined general trends and similarities across commodities. Where pricing patterns are very different, an attempt was made to discover why. This study was published as a CRS monograph.

Externally Funded Research

Evolution of the Manufacturing Components in the Ontario Metal Mining Industry
Alan Green, Department of Economics, Queen's University

This study, funded by a grant from the Ontario Ministry of Northern Development and Mines, studied the evolution of the manufacturing component of mining production in the province of Ontario. This work was seen as part of the general review of the Ontario Mining Act, particularly the requirements for Domestic Processing set out in Section 104 of the Act. The study examined the extent of domestic processing by specific metal, i.e. copper, nickel, gold, iron ore, etc. The analytical focus of this exercise was to examine the extent of Value Added Growth by particular metal groups over time.

Assessing the Impact of Alternative Types of Regional Development Policy on the Economics of Base Metal and Gold Mining in Newfoundland
Brian Mackenzie, Michael Doggett, and Michel Bilodeau, Centre for Resource Studies

The objective of this study was to gain an improved understanding of the economic impact of alternative types of regional development policy on base metal and gold exploration, development and productions in Newfoundland and Labrador. By developing a deposit- specific data base and evaluation procedure for assessing the economics of base metal and gold exploration, development and production in Newfoundland and Labrador, the study provided support for policy and planning. The impact of alternative types of regional development policy was evaluated, compared, and applied to the mineral supply assessments. This comparison and evaluation used measures of policy efficiency, government revenue effects, and private investment incentive. This study was published as a CRS Technical Paper.

Mine Discovery and Development in Ontario: Economic Guidelines for Government Policy
Brian W. Mackenzie and Michael Bilodeau, Centre for Resource Studies

The objective of this research was to provide support for policy and planning within the Ministry of Northern Development and Mines. This was accomplished by developing a deposit-specific data base and evaluation procedure for assessing the potential for discovering and developing metallic mineral deposits in Ontario. The project updated and extended an existing base metal data base, assessed the economic characteristics associated with discovering and developing base metal deposits in Ontario, illustrated how this type of assessment can be used to evaluate government policy effects, and carried out a preliminary economic appraisal of the discovery and development of gold deposits in Ontario. This study was published as a CRS Technical Paper.

Comparative Study of Mineral-Related Research and Development Funding

Margot J. Wojciechowski, Centre for Resource Studies

This study identified sources and mechanisms of mineral-related R&D funding and performance in Canada and compared them to the situation in other Canadian resource sectors. For comparative purposes, the study also considered mineral R&D funding and performance in Australia, Finland, France, Sweden, West Germany, United Kingdom and the United States. The implications of special circumstances and conditions with respect to the role and organization of the mineral industry and its R&D support in the various countries were discussed. A final report has been submitted. The final report and eight background studies have also been released as CRS draft reports.

Trends in R&D Funding and Education in Earth Sciences

Margot J. Wojciechowski, Centre for Resource Studies

The Geoscience Council of Canada commissioned a comparative study of R&D funding and education in the earth sciences in Canada and in a number of other mineral-producing countries. The study also looked at the economic contribution of earth sciences to the mineral industry, particularly to the mineral exploration sector. A final report has been submitted. The final report and six background studies have also been released as CRS draft reports.

Research Funded by CRS

Economic Analysis of Western Canadian Export Coal Supply
David L. Anderson, School of Business, Queen's University

This study will examine the economic structure of the western Canadian export coal industry. It will address the merits of the industry's rapid development since 1960, especially in the post-1980 period. In this regard, particular attention will be placed on the debate surrounding the northeast British Columbia coal project. The study will also describe and assess the problems currently facing export coal producers and outline the industry's future prospects.

Pricing and Trade Policy in the Canadian Resource Sector
Tim Hazledine, Department of Agricultural Economics, University of British Columbia

This study will analyze the impact on the resource sector of future cuts in Canadian and foreign tariffs on tradable goods. The study will examine both the direct (partial equilibrium) impact that elimination or reduction of a tariff on a resource commodity has on the price paid in Canada for that commodity, and the indirect (general equilibrium) impact through changes in input prices and the exchange rate of across-the-board tariff changes on all traded goods. As well, the implications for the sector of flattening of "effective protection" (higher tariffs on more highly processed products) will be analyzed.

Australian and Canadian Export Coal: A Policy Analysis of Relative Competitiveness
David L. Anderson, School of Business, Queen's University; and Donald W. Barnett, Macquarie University, Australia

The objective of this study is to assess the relative competitiveness of Australian and Canadian export coals in the Pacific Rim market. The analysis focuses on the domestic cost structure of each industry with special attention given to operating costs, non-profit and profit-based taxes, domestic transportation levies, and infrastructure financing arrangements.

The Challenge to Canadian Mineral Exports to the USA: A Comparative Assessment of Protectionist Pressure in Copper, Potash, and Uranium
David G. Haglund, Centre for International Relations, Queen's University

This study will explore the extent to which Canadian export interests in three commodities - copper, potash, and uranium - are or may be affected by the apparent increase in U.S. Congressional sentiment for protectionism. The author began to examine the protectionist challenge as part of a broader research project on "Canadian Interests and U.S. Mineral Policy" with the assistance of a CRS grant-in-aid in 1984. The proposed research will develop further some of the issues examined in the earlier study and extend the scope of the inquiry to include copper and potash. Several journal articles and a book, *The New Geopolitics of Minerals: Canada and the International Resource Trade* (published by UBC Press), have resulted from Dr. Haglund's research thus far.

Economic Analysis of Canadian Gold Supply
Brian Mackenzie and Michael Doggett, Centre for Resource Studies

A comprehensive mineral deposit data base is being assembled, documenting short-, medium-, and long-term aspects of Canadian gold supply, concentrating on trends during the 1946-85 period. This information has been organized on microcomputer spreadsheets for evaluation and analysis. The plan is to integrate this work with the economic evaluation procedures and base metal data base which has been developed at CRS since 1975. A paper on gold exploration economics, arising from this research, was published as "Economic Guidelines for Gold Exploration in the Western Canadian Shield" in Gold in the Western Shield, ed. L.A. Clark, Special Volume 38, CIMM, Montreal, 1986. Two papers were prepared for the CRS policy workshop on Long-Term Prospects for Gold Mining. One was published as CRS Working Paper No. 41: Economic Trends in Canadian Gold Supply. The other, "Long-Term Breakeven Price for Canadian Gold Supply" (with Donald Cranstone) was published as part of CRS Proceedings 20. The data base was used for the externally funded contracts with the Ontario Ministry of Northern Development and Mines, and the Newfoundland Department of Mines completed in 1988. The final reports from these projects have been revised and are being published as CRS technical papers. This research was also the basis for a paper presented at Bicentennial Gold 88 in Melbourne, May 1988, which has now been expanded into a CRS working paper, "Economic Aspects of Gold Exploration: How Much is Too Much?" currently being reviewed. Project results were presented by the researchers as principal session leaders in the "Gold Deposit Evalution" seminar held at the Helsinki University of Technology in October 1988. The research was also used for a paper entitled "Trends in Exploration Performance: The Search for Base Metals and Gold in Canada" presented at the March 1989 annual meeting of the PDA. The data base is being extended to include 1986 and 1987.

Mineral Deposit Database
Brian Mackenzie and Michael Doggett, Centre for Resource Studies

An extensive mineral deposit database has been developed at the Centre for Resource Studies since 1975 to assess the potential value of mining in Canada, and to measure the direct effects of government mineral policies. The last comprehensive update of this information was in 1983. The purpose of the project is to update the database to 1987 and to extend the coverage to include gold mining. The first part of this work was carried out in 1987-88 in conjunction with the projects externally funded by the Ontario and Newfoundland governments. The final reports for these projects are currently being revised for publication as CRS technical papers. In its present form, the database includes 539 base metal and gold deposits discovered in Canada to 1985.

PCDEP/PCSIM Software Package Development
Brian Mackenzie, Centre for Resource Studies and Michel Bilodeau, Dept of Mining and Metallurgical Engineering, McGill University

This project involves the development of a software package based on the existing software used by Bilodeau for analysis of Mackenzie's data base, and on the development of a user manual to make the software accessible to purchasers. The software will be extended to include current actual Canadian income and mining systems; integrated company basis of taxation; approximation of selected foreign tax systems; and a generalized deposit revenue and cost option. The manual will describe the economic evaluation techniques used, outline the information and estimation requirements, discuss the taxation considerations, and provide detailed instructions on use of the software, as well as case studies as illustrations. The package will be produced and marketed by CRS.

Mineral Policy Update
Moira Jackson, Centre for Resource Studies

This study monitors mineral policy and program changes made by the federal government, the territories, and the provinces.

Federal and Provincial Taxation of Resource Industries: Impact and Implications for Reform
Jack Mintz and Robin Boadway, Queen's University

The purpose of this study is to describe and assess how corporate and provincial mining taxes influence the investment decisions and production structure of Canadian mining firms. While earlier literature tried to evaluate the effect of taxation by measuring the average tax rate, this study measures the "effective" tax rate (the tax imposed on the marginal project). In addition to providing an analysis of the impact of taxes on mining firms, the researchers propose measures for tax reform based on their findings. The book is in the process of publication.

The Impact of State-Owned or State-Assisted Mines and Smelters on International Markets
Ciaran O'Fairchellaigh, Griffith University

This study will examine the implications for producers in "free market" situations (i.e. in Canada and Australia) of competing with producers whose input costs and/or output levels are influenced by non-commercial criteria. The researcher will concentrate mainly on copper, iron ore, and aluminium. Dr. O'Fairchellaigh visited CRS for three months in 1986 to collect data and conduct interviews on the Canadian situation.

Translations of East European Articles on Effects of Mining on the Environment
G. Kenyon Rutherford, Department of Geography, Queen's University

In recent years a considerable volume of research on the effects of the mining industry on the environment has been carried out in Eastern Europe. The results of much of this work is now available in publications originating in USSR, East Germany, Czechoslovakia, Poland, Bulgaria and Hungary. A reasonable selection of these are archived in the CANMET library in Ottawa. As the results of some of this research may be germane to the Canadian mining industry, the objectives of research is to provide: a list of titles of appropriate articles published in English in these journals; a list of articles for which there is an English/French summary; and a list of article title translations for other relevant articles.

R&D Funding in the Mineral Sector
Margot Wojciechowski, Centre for Resource Studies

The project draws on the information gathered in the course of two comparative studies of mineral-related R&D funding conducted by CRS, one in Earth Sciences which was commissioned by the Canadian Geoscience Council, and one in mining and metallurgy which was commissioned by CANMET. This second phase of the study will extend the analysis and lead to several CRS publications drawing on the experiences of the eight OECD countries included in the original study.

Externally Funded Research

Impact of Taxation on the Economic Viability and Competitive Position of Mining Projects in the Canadian Uranium Industry

Brian W. Mackenzie, Centre for Resource Studies

Representative uranium mining project profiles are developed for four types of deposit: high-grade unconformity type, quartz pebble conglomerate type, conventional-grade unconformity type, and uranium-base metal type. Each of the four projects is first evaluated on a potential, before-tax basis. Then, the impact of taxation on each project is examined for three locations: Saskatchewan, one other Canadian province or territory, and one Australian state or territory. Results are to be presented, compared, and analyzed using economic measures of project viability, investment incentive, tax burden, and competitive position. This project is externally funded by the Uranium and Nuclear Energy Branch of Energy, Mines and Resources Canada.

Firm Level Productivity Measurement for the Ontario Metal Mining Industry

Alan Green, Department of Economics, Queen's University

This study builds on previous work by the researcher in this area. Using more detailed observations on inputs and outputs it will be possible to assess the impact of such factors as industry rationalization and changes in product mix on the industry's performance. In addition, analyses can be made to differentiate the effects on profits due to price changes and due to productivity improvement. This micro study will provide the government and industry with a new tool to aid in the decision making process. The evidence for the study will require information drawn from the Census of Mines and the industry itself. This project is externally funded by the Government of Ontario.

New Publications

The following new publications arising from the CRS research and seminar programs were released during 1988-89.

Long Distance Labour Commuting in the Canadian Mining Industry, by Keith Storey and Mark Shrimpton was published in January 1989. This is number 43 in the CRS series of working papers. This report identifies and documents current and proposed Canadian mining projects using long distance labour commuting (LDC), estimates its future use, and identifies the issues, advantages and disadvantages associated with LDC.

Prospects for Minerals in the 90s, edited by Peter R. Richardson and Renka Gesing, was published in December 1988. It contains the proceedings of a policy discussion seminar convened by the Centre for Resource Studies in 1987. The purpose of the seminar was to discuss the new business environment in which the minerals industries operate, focusing on the following challenges: future demand and supply patterns for major minerals: trade and access to markets; new competition from engineered materials; safety and occupational health.

Mining Potential in Northern and Southern Canada: Guidelines for Regional Development Policy, by Leo J. Verleun and Brian W. Mackenzie, was published in June 1988. It is number 21 in the CRS monograph series and compares endowment and locational characteristics of exploration and mining in the northern territories with those of the more-accessible southern provinces.

Pricing of Metals, by Margaret E. Slade, was published in June 1988. It is number 22 in the CRS monograph series. The primary objective of this study is a first step in the determination of whether commodity exchanges fairly determine the price of metals and should therefore be supported. A statistical analysis of pricing and production trends attempts to uncover general trends and similarities across commodities. Where pricing patterns are very different, an attempt was made to discover why.

An Inter-Sectoral Study of Canada's Resource Industries, by Terry Bennett and David L. Anderson, was published in May 1988. It is number 8 in the CRS technical paper series. This publication draws on existing data sources (primarily computer data bases) to demonstrate the impact of mining on Canada's economy, especially in comparison with other resource industries such as forestry and petroleum.

A complete list of CRS publications appears at the end of this report.

Presentations Made by CRS Researchers
(Based on CRS-related work)

Michael Doggett:

(with Brian Mackenzie) "Economic Requirements and Consequences of Gold Exploration", Bicentennial Gold 88, Melbourne, May 18, 1988.

"Setting the Stage: Canadian Base Metal Exploration and Discoveries", Jolliffe Club Conference, Queen's University, February 3, 1989.

Brian Mackenzie:

(with Michael Doggett) "Economic Requirements and Consequences of Gold Exploration", Bicentennial Gold 88, Melbourne, May 18, 1988.

"Long-Term Prospects for Gold Mining", Conzinc Rio Tinto of Australia (CRS) Limited, Melbourne, May 20, 1988.

"Economic Potential of Mining", Victorian Chamber of Mines", Melbourne, May 26, 1988.

"Economic Guidelines for Gold Exploration", Australian Mineral Foundation, Melbourne, May 1988 (one-week seminar).

"Economic Guidelines for Gold Exploration", James Cook University of North Queensland, Townsville, June 1988 (one-week seminar).

"Economic Guidelines for Gold Exploration", Western Australian School of Mines, Kalgoorlie, June 1988 (one-week seminar).

"Economic Guidelines for Exploration Planning", Queen's University, December 1988 (one-week seminar).

"Mineral Exploration and Mine Development Potential in Ontario", presented at Mineral Development Forum, Ontario Mines and Minerals Symposium, Toronto, December 1988.

"Mineral Exploration Economics: Key Characteristics, Benefits of Control, Ingredients of Success", 8th Annual Engineering Geology Conference, Queen's University, 21 January 1989.

(with Michel Bilodeau) "Trends in Exploration Performance: The Search for Base Metals and Gold in Canada", Prospectors and Developers Association Convention, Toronto, 6 March 1989.

Principal lecturer, "Applied Mineral Economics: Decision-Making Techniques for Industry", Memorial University of Newfoundland, St. John's, March-April 1989 (two-week course).

"Economic Potential of Base Metal and Gold Mining in Newfoundland", Department of Mines, St. John's, 31 March, 1989.

Principal lecturer, "Mineral Project Evaluation Techniques and Applications", McGill University, Montreal, April 1989 (two-week seminar).

Margot Wojciechowski:

"Science and Technology Policies and Canada's Mineral Resource Sector", Queen's University, School of Public Administration, Technology, Economic Development and Public Policy (PADM-851 Spring Policy Seminar), May 19, 1988.

"International Perspective on Government and Industry Investment in Research in the Mineral Sector", Technology Trends Conference, Ottawa, May 24, 1988.

"Comparative Study of R&D Funding Trends in Earth Sciences", presentation of final report to the Canadian Geoscience Council, Ottawa, Geological Survey of Canada, December 8, 1988.

"Justifying R&D Investment in the Mineral Sector: Don't Neglect the Upstream Imperatives", seminar presentation to CANMET, Ottawa, January 31, 1989.

"R&D Funding in the Canadian Mineral Sector", presentation to workshop on Technology Transfer and Innovation in Chilean Mining, Santiago, Chile, April 18, 1989.

External Publications by CRS Researchers

Brian Mackenzie

"Economic Productivity of Base Metal Exploration in Australia and Canada", with R. Woodall, pp. 363-417 in *World Mineral Exploration: Trends and Economic Issues*, J.E. Tilton, R.G. Eggert, and H.H. Landsberg eds., Resources for the Future, Washington, 1988, 464 pp.

"Pushing Back the Frontier", with Leo Verleun, *The Northern Miner Magazine*, February 1989.

Margot Wojciechowski

"Overcoming the obstacles to technological innovation in process and product metallurgy", Peter R. Richardson and Margot J. Wojciechowski, *CIM Bulletin*, vol. 81, no. 916, August 1988.

CRS Policy Discussion Seminars

The CRS Policy Discussion Seminars are designed to bring together senior individuals from federal and provincial governments, corporations, universities, trade unions, and other interested groups to discuss current mineral policy issues. The informal atmosphere is conducive to the free and constructive exchange of views. In a typical two-day session, six or eight speakers present background information and views on the issue. Subsequent discussion in small groups and open sessions allow the participants to develop a mutual understanding of the problem and of other viewpoints, and to discuss potential solutions. The proceedings are published, including the papers and some analysis and conclusions.

Marketing Policy Issues in the Canadian Mineral Industries

In November 1988, the nineteenth CRS Policy Discussion Seminar on Marketing Policy Issues in the Canadian Mineral Industries was held at Queen's University. It brought together an interdisciplinary group of 27 planners, executives, and researchers from senior levels in the mining industry, government, and university. The purpose of the seminar was to focus on the marketing of minerals in a changing world economy. The following papers were presented:

"A Customer Perspective", by R. Bauer
"Market Effects of Developments in the Nonferrous Mineral Industry in China", by L. Spiess
"Changes in Mineral Trading Patterns", by J. Tilton
"Pricing Alternatives", by M. Slade
"The Role of Terminal Markets", by C. Green
"The Role of Trade Associates", by W. Dresher
"Developing Marketing Expertise", by W. Deeks
"Future Market Development Needs", by L. Morris
"Product Development Challenges", by H. Wynne-Edwards

CRS Perspectives

Two issues of CRS Perspectives and one special paper were published during the current year. Perspectives is an occasional bulletin that contains comment about the Canadian mineral industry, reviews, and news of CRS activities and publications. Perspectives is sent to the entire CRS mailing list of about 4,500 individuals and institutions in Canada and abroad with interests in mineral policy issues.

In June 1988 a CRS Special Paper was published; it featured W.R.O. Aitken's keynote address to the CRS Board of Directors and Advisory Council, April 27, 1988, entitled "The Environment and the Economy".

The November 1988 issue of Perspectives featured articles by Peter R. Richardson, "Strategic Change in CANMET" and Margot J. Wojciechowski, "International Trends in Mineral R&D". In the April 1989 issue, Peter Richardson considered industry's response to the current strong demand for metals, and Moira Jackson reviewed the findings of the CRS marketing seminar.

Financial Arrangements

The Centre disbursed $124,283 on administrative and $338,633 on research activities during the year.

Continuing financial support is received from The Mining Association of Canada (MAC) and Energy, Mines and Resources Canada (EMR). Funding from MAC for 1988-89 was $196,000 per year ($78,400 for administration and $117,600 for research). This funding was matched by EMR. A total of $25,129 was recovered from the sale of publications and seminar registration fees.

The Centre also seeks to serve the research needs of other agencies. In the current year, research support was received in the amount of $40,344 from agencies other than the Centre's permanent sponsors.

The Board of Directors

The Board consists of sixteen members. The Executive Director and the Advisory Council Chairman are ex-officio members. Of the remainder, four are appointed by The Mining Association of Canada, three by Energy, Mines and Resources Canada, and seven by the Principal of Queen's University. The Chairman is C. George Miller, Managing Director, The Mining Association of Canada. The chairman of the Research Advisory Committee has observer status at Board meetings.

The Board met twice during the year; the spring meeting was held April 27, 1988, in Kingston and the fall meeting took place October 19, 1988 in Toronto. On these occasions, the Board discussed a number of ongoing and potential research themes, the recommendations of the Advisory Council, and various administrative and policy matters.

During 1988-89, D. Sinclair retired from the Board, and W. McLatchie joined as a new appointee. R. Boadway and C.G. Miller were reappointed.

Members of the 1988-89 Board of Directors were as follows:

C.T. Asplund, Queen's University
J. Beausoleil, Department of Finance
R.W. Boadway, Queen's University
P. Calder, Queen's University
M.D. Everell, Energy, Mines and Resources
K.C. Hendrick, Noranda Minerals Inc.
P.C. MacCulloch, Selco Division, BP Resources
G. Mahoney, L'Energie et des Ressources
W. McLatchie, Queen's University
C.G. Miller (Chairman), The Mining Association of Canada
E.K. O'Brien (Observer), Inco Limited
R.E. Simeon, Queen's University
R. Smith, Queen's University
P. Steen, Corona Corporation
R. Sully, Energy, Mines and Resources
R.J. Uffen, Queen's University
M.J. Wojciechowski, Centre for Resource Studies

Advisory Groups

The Advisory Council

The Advisory Council currently has a membership of sixty-four. All researchers associated with the work of the Centre are appointed to membership for the duration of the research or a minimum of one year. Other members, representing governments, industry, labour, the professions, and other interested organizations and groups, are appointed for a three-year term. The functions of the Council are to advise the Board, primarily on the research program, and to act as advisors to the Centre's staff.

The Council's 1989 annual meeting was held on April 27, under the chairmanship of Gilles Mahoney. Reports on the Centre's ongoing activities were received and discussed, along with presentations by a number of CRS and external researchers.

Advisory Council members for 1988-89 were as follows:

Appointed Members

P. Andrews, Energy, Mines and Resources
W.J. Barbour, Noranda Mines Limited
K. Brewer, Energy, Mines and Resources
W.K. Buck, Consultant
P. Caragata, Investment Canada
D. Davis, The SNC Group
A. Dorr, Industry, Commerce & Tourism
D. Eldon, The Mining Association of Canada
J.M. Fleming, Department of Mines and Energy
D.M. Fraser, Denison Potacon Potash Company
J. Garnett, Consultant
I. Haugh, ILAM Associates Limited
D. Hull, Energy, Mines and Resources
C.D. Hunt, Institute of Resources Law
W.G. Jeffery, The Mining Association of Canada
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Linda Noble, Departmental Assistant (to July 1988)
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In addition, many others have assisted in the work of the Centre at various times. The contributions of Harry Boumeester, Renka Gesing, Chris Harper, Moira Jackson, Tony Lempriere, Kevin O'Grady, and Nathalie Proulx are gratefully acknowledged.

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